

Capsule Report¹

Calculation of TMDLs for Copper and Nickel in South San Francisco Bay

April 1999

Background

In 1986 the Regional Board's Basin Plan established water quality objectives for toxic metals for San Francisco Bay. It specifically exempted the South Bay (San Francisco Bay south of the Dumbarton Bridge) from those objectives, referring to the South Bay as a "unique, water –quality limited hydrodynamic and biological environment that merits continued special attention by the Board, and calling for the development of site-specific objectives. In the meantime, the Basin Plan stated that "ambient conditions shall be maintained."

The south bay Cities have been working with the Regional Board since 1995 to develop a strategy and approach for addressing permit compliance issues for specific problem metals and for developing an overall regulatory approach for handling problems related to protection of beneficial uses that may arise in the long-term. That effort coincided with the Regional Board's emphasis on developing watershed-based programs and led to the initiation, in 1996, of the Santa Clara Basin Watershed Management Initiative (WMI), as a Regional Board pilot effort.

A major aim of the WMI is to coordinate existing regulatory activities on a basinwide scale, ensuring that problems are addressed efficiently and cost-effectively. Stakeholders (i.e., representatives from federal, state and local regulators, local business and industry, professional and trade organizations, environmental, resource conservation and agricultural groups, and local public agencies) help manage the WMI through monthly Core Group meetings. A number of other subgroups conduct work under the Core Group umbrella consistent with the WMI objectives and goals. The Bay Monitoring and Modeling Subgroup (BMM) was formed, in part, to provide recommendations regarding monitoring and modeling strategies that form the scientific basis for assessing the ecological condition of the Lower South Bay.

Consistent with the Board's Basin Plan and the goals and objectives of the WMI, the Bay Monitoring and Modeling (BMM) Subgroup outlined the regulatory challenges facing the South Bay and a roadmap for addressing them in the BMM's Work Plan (revised November 5, 1998). The Workplan also outlines the anticipated technical, legal, and regulatory work effort believed necessary by the Initiative stakeholders to address water quality questions in the Lower South Bay.

As noted in the BMM Workplan, the overall challenge is to establish a sound technical basis for management of the Lower South Bay including municipal wastewater and stormwater permit requirements that are protective of beneficial uses, effective, and not prohibitively expensive. This includes:

- assessment of the beneficial uses of the Lower South Bay;
- consideration of site-specific water quality objectives;
- development of a Total Maximum Daily Load (TMDL²); and

¹ The capsule report is the first in a series of status reports produced by the TMDL Project Team to keep stakeholders apprised of the status of the TMDL effort.

- development of associated Wasteload Allocation /Load Allocation (WLA/LA) for pollutants causing impairment of the Lower South Bay.

This will require understanding the relationships between pollutant sources and the complex hydrodynamic, sediment, chemical, and biological transport processes, and pollutant levels in the Lower South Bay. With or without water quality objectives, the Lower South Bay has been listed as an impaired water body under Section 303(d) of the Clean Water Act (CWA). This has triggered a CWA mandate for the State to establish TMDLs and WLAs.

The 1998 303(d) list, recently approved by US EPA, specifically identifies copper and nickel as high priority pollutants of concern for the lower South Bay. The list identifies municipal point sources, urban and storm runoff, and atmospheric deposition for copper as the primary inputs of these metals to the Lower South Bay. The Clean Water Act (Section 303(d)) establishes a process that provides for more stringent water quality-based controls when technology-based controls are inadequate to achieve State water quality objectives.

A copper and nickel TMDL project is being conducted as part of the Santa Clara Basin Watershed Management Initiative (WMI). The WMI is a stakeholder-driven process that commenced in June 1996 and is aimed at developing a watershed management plan for the Santa Clara Basin. One of the subgroups of the regional WMI, the Bay Monitoring and Modeling (BMM) subgroup, is taking the lead on the TMDL development and the City of San Jose is funding the development of a TMDL for copper and nickel.

Copper and Nickel TMDL Project

In January 1998 the City of San Jose initiated a 4-year, \$3.5 million effort to conduct special studies in support of the copper and nickel TMDLs. The TMDL project is one of the most comprehensive, chemical-specific, environmental assessments ever conducted in San Francisco Bay. The City has contracted with a consultant team to address a number of key issues as part of the first series of TMDL project tasks.

- Develop a Conceptual Model for Copper and Nickel Cycling
- Assess Pollutant Levels and Levels of Impairment
- Recommend Short and Long-term Studies and Implement Short-term Investigations
- Evaluate Existing 2-D /3-D Models

As part of the TMDL project, the copper and nickel TMDLs are also being integrated into the ongoing Santa Clara Basin Watershed Management Initiative (WMI), and a major emphasis is being placed on establishing and maintaining public and industry involvement. One indication of the collaborative aspect of this effort is the formation of a TMDL Work Group (TWG). The TWG is made up of stakeholders from wastewater and stormwater dischargers, environmental groups, industry, regulatory agencies, and other involved citizens, and it has been formed as part of the WMI's Bay Monitoring and Modeling Subgroup. The charter of this group is to guide the TMDL process and to develop new and preferred ways to make the process understandable and equitable.

² The emergence of the TMDL process as an important planning and regulatory decision-making tool is a recent development in national, regional, and local efforts to achieve continued improvement in the quality of the nation's surface waters. The TMDL, or total maximum daily load, establishes the allowable loadings of a pollutant that a water body can receive without violating applicable water quality standards or harming beneficial uses.

A Technical Review Committee (TRC) has also been formed to review the technical products of the TMDL effort. The TRC is made up of nationally recognized technical experts in such areas as the behavior of metals in aquatic systems, hydrodynamics, estuarine modeling, ecological effects of trace metals, sediment transport processes, and atmospheric modeling.

Although conducting the TMDL is a State requirement, there is optimism that these TMDLs will provide a unique opportunity to address the many complex issues associated with setting water quality objectives for the South Bay. Several stakeholders have noted that the collaborative approach that is being taken to prepare the TMDLs is likely to be more successful than the programmatic approach that has traditionally been used by state and local regulatory agencies.

The focus of the copper and nickel TMDL efforts during the first year of activity has been in the following five primary areas of investigation:

Data Collection and Analysis. One of the first efforts has been to create an extensive database that is available to both technical and stakeholder personnel involved in the project. The database is unique in that it brings together different types and large volumes of information (over 1.5 million records have been entered so far) focused on the specific issues of TMDL development for copper and nickel in the Lower South San Francisco Bay. Many investigators in the area have contributed to the development of a database that consists of water quality data, sediment quality data, sediment core data, point and nonpoint source loading data, basemap information, bathymetric data, hydrodynamic data, suspended solids data, air quality data, and photographic/satellite imagery.

Additional data will continually be entered, as they become available during the project. To facilitate use and understanding of the data, the database has been created in a Geographic Information System (GIS).

Conceptual Model Development. A conceptual model that depicts the current understanding of the processes that influence copper and nickel cycling in Lower South San Francisco Bay and adjacent Bay waters was recently produced. To communicate the information that has been developed on loadings, sediment transport and copper and nickel cycling, the conceptual model makes extensive use of graphics. The objective of this effort was to develop a tool for effectively communicating the existing information to a wide audience of interested stakeholders. Diagrams such as the one shown in the accompanying figure can be used to facilitate the discussions of upcoming TMDL issues such as source characterization, beneficial-use impairment, simulation model development, and the design of special studies. The conceptual model was the topic of one of the poster sessions at the recent State of the Estuary Conference.

Source Characterization. The major loads of copper and nickel that enter the South Bay are being quantified, based on existing data. The loadings have been divided into four major pathways: wastewater discharges, tributary loads, atmospheric deposition to the surface water, and sediment exchange with the water column within the Bay. This effort is the first step in identifying the major pathways of copper and nickel loading and allows for future steps to identify sources and the development of appropriate control measures, if necessary. It is also the purpose of this work to identify limitations and uncertainties in the existing loading data so that additional efforts to improve these estimates can be focused in the appropriate areas.

Assessment of Beneficial Use Impairment. In January of this year, over 50 individuals from local regulatory agencies, municipal dischargers, stormwater management groups, environmental groups, and other South Bay stakeholder groups participated in an impairment assessment workshop held at

the San Francisco Bay Regional Water Quality Control Board. Information was presented on progress made in developing indicators for assessing impairment to beneficial uses. The results of the workshop were also presented at the recent State of the Estuary Conference. Later this spring, an Impairment Assessment Report will be completed. The purpose of the impairment assessment is to determine if and when and how the beneficial uses of the South Bay are adversely affected by copper and nickel, and what concentrations cause these problems. The results of this assessment will determine the course of all further activities associated with these TMDLs.

Simulation Model Development. The first of several technical reports that will be produced in the evaluation of existing two- and three-dimensional numerical simulation models was completed in December 1998. This document identifies models that could be used in the calculation of TMDLs for copper and nickel in South San Francisco Bay. This evaluation process is important because numerical models will be the primary tool used to evaluate the responses of the South Bay to copper and nickel loading. This initial report identifies the model components that are necessary to simulate and predict the transport and fate of copper and nickel in South San Francisco Bay. Twenty potentially applicable models were identified and classified according to type and functionality, and a subset of 10 models was recommended for further evaluation.

TMDL Workgroup Activities

A brief summary of the key activities of the TWG is presented below.

TWG Activity	Timeframe
TRC convened to review the copper and nickel conceptual model	April 1999
Draft Beneficial Use Assessment Report submitted to TWG for review	April – June 1998
TRC convened to review Assessment Report	July 1999
TWG Finalizes Assessment Report	August 1999
TWG/BMM develop Regulatory Report	April – August 1999
CORE Group Briefings (anticipated)	July, August, October 1999
CORE Group endorses TWG TMDL Report and transmits to RWQCB for review and action	November 1999

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